



Recommendations for Sustainable Groundwater Management:

Developed Through a Stakeholder Dialogue

May 2014

***“GROUNDWATER IS ONE OF CALIFORNIA’S MOST IMPORTANT
DROUGHT BUFFERS, AND CRITICAL TO A SUSTAINABLE WATER FUTURE”***

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EXECUTIVE SUMMARY

Groundwater is critical to California's water supplies, accounting for about 40% of the water used in normal years and up to 60% of the water used during droughts.

Over 75% of Californians—as many as 30 million people—rely on groundwater for a portion of their drinking water. Groundwater resources are essential to the state's multi-billion dollar agriculture industry, as well as other sectors of the economy. Groundwater basins are found throughout the state and store billions of gallons of water, eclipsing the size of any of the state's other reservoirs. As California confronts one of the worst droughts in recorded history, it is critical to consider ways to protect this invaluable resource for the present and future health of California's farms, cities, and environment.

Managed correctly, groundwater provides a dependable and long-term supply of water for current and future generations. Groundwater can provide an essential buffer against droughts by providing additional water supplies in years when there is not enough rainfall or snow.

Unfortunately, in many parts of California groundwater is being pumped much faster than it is being replenished naturally or through methods involving infrastructure. Similar to the way a checking account works, when groundwater withdrawals exceed deposits, the result is an "overdraft." Overdrafting our groundwater leaves less water available during critically dry years, when farmers need it most. It causes conflicts between neighbors and deprives future generations of a vital resource.

As groundwater levels drop, the costs farmers and others must pay to retrieve that water can increase significantly. If enough of an overdraft occurs, the land can literally sink (called subsidence), causing significant damage to buildings and infrastructure, and leaving less room underground to store water in the future. In some cases, groundwater overdraft can result in significantly reduced water quality.

The solution to this problem is a consistent, statewide approach for *sustainable* groundwater management.

In January 2014 the Brown Administration released its *California Water Action Plan* that highlighted the importance of groundwater management at the local level. Shortly thereafter, the Brown Administration requested the California Water Foundation (CWF) to initiate a Stakeholder Dialogue ("Dialogue") and prepare a report to Governor Brown and the State Legislature with recommendations to achieve sustainable groundwater management. The Dialogue involved voices from agriculture, water agencies, under-represented communities, cities, environmental interests, and businesses throughout the state.

CWF is deeply appreciative of all who participated and shared their perspectives. The extensive outreach from the Dialogue highlighted a number of key findings that support and inform a statewide approach to achieve sustainable groundwater management:

- Groundwater is essential to California's economy, environment, and public health and safety.
- Current groundwater trends are not sustainable.

- Groundwater is closely linked to surface water, and is part of an interrelated system of water infrastructure, management, and the environment.
- Groundwater is most effectively managed at a local and regional level.
- Local groundwater managers require better tools to do their jobs.
- Protection of private property and water rights is imperative.
- Clear and meaningful state roles are needed to protect state interests.
- Groundwater is an important source of drinking water.
- Correcting the problem will take time, but in many places time is of the essence.
- Funding is needed to support effective management.
- Access to information is important for management and citizen understanding.
- Comprehensive legislation is necessary to address the state's complex groundwater management challenges.

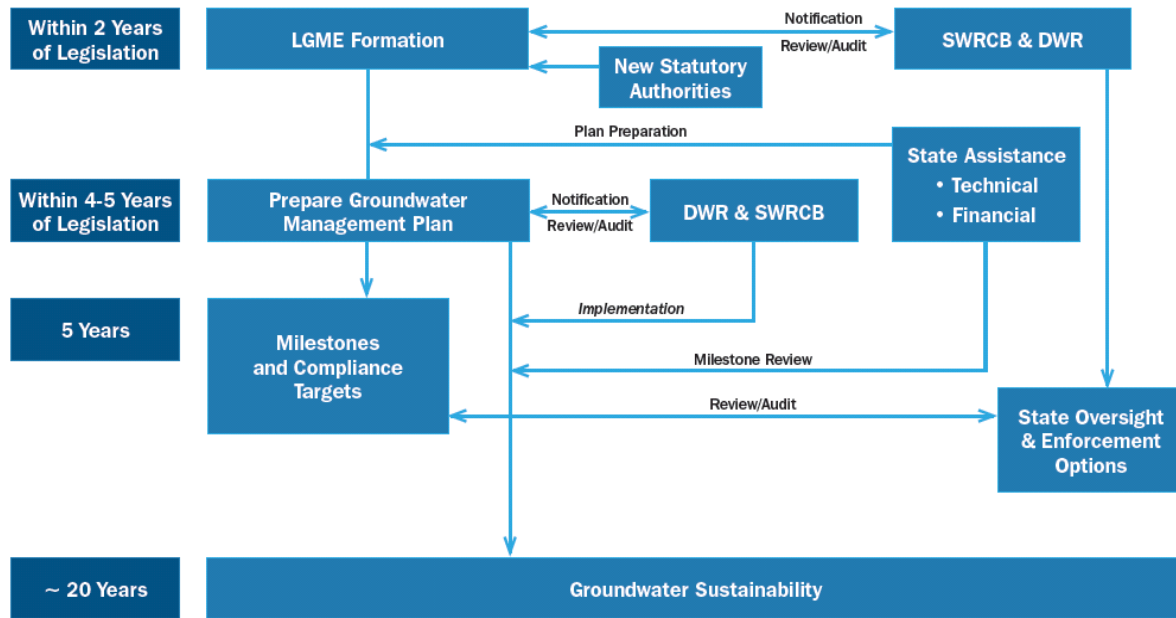
The Dialogue built on these findings to develop seven recommendations that provide a framework for California to protect and sustainably manage its groundwater supplies so they are available when needed most by California's residences, farms, businesses, and environment, today and in the future. CWF's recommendations are:

1. Adopt a definition of "sustainable groundwater management."
2. Develop a statewide program that establishes a system of prioritization for all subbasins.
3. Establish local groundwater management entities (LGMEs).
4. Provide LGMEs with tools and authorities to achieve sustainability.
5. Require LGMEs to develop management plans with benchmarks and milestones.
6. Establish a clear and coordinated state role for assistance, oversight, and enforcement.
7. Provide funding for groundwater management.

These seven recommendations constitute distinct elements of a complete and comprehensive program. CWF pledges to continue to work with the Brown Administration, the State Legislature, and the broad diversity of stakeholders interested in the sustainability of California's water resources, to further refine and implement this package of recommendations over the coming months.



Proposed Groundwater Management Framework



This figure illustrates local and state roles and authorities within CWF's proposed groundwater management framework.

INTRODUCTION

The California Water Foundation (CWF) was established in 2011, as an initiative of Resources Legacy Fund, in an effort to move California to a more sustainable water management system for the benefit of farms, cities and the environment. This initiative stems from a fundamental observation that a wide range of stressors, including changing climate patterns, increasing population, aging infrastructure, and environmental degradation have reduced the water system's resilience and sustainability. CWF has invested in urban conservation, waste water recycling, flood plain management, stormwater capture, and a wide range of demonstration projects and stakeholder coalitions. As part of these investments CWF has consistently emphasized that integrated management of water resources, including groundwater, is essential to achieving resilience and long-term sustainability. California's groundwater resources provide a highly flexible supply that can be used to respond to drought, store wet-year water, and "fill the gap" when surface supplies are unexpectedly curtailed. Groundwater can be the centerpiece of a sustainable supply for farms, cities, and the environment, but only if it is effectively managed.

The *California Water Action Plan* released by the Brown Administration in January 2014 highlighted the importance of groundwater and the value of local management. In response to the Brown Administration's request for recommendations on groundwater legislation, CWF initiated a Stakeholder Dialogue ("Dialogue") process to prepare a report to Governor Brown and the State Legislature with recommendations to achieve sustainable groundwater management. Over the intervening eight weeks a wide range of knowledgeable people from around the state helped frame recommendations that reflect a primary local management role with clear targets, flexibility about local governance, a need for technical assistance and funding, and a meaningful state role in oversight and enforcement.

The results of this effort are organized and presented as follows in this Report:

- A review of the Dialogue process that provides additional details about participating stakeholders and their perspectives;
- A description of the background and challenges for California's groundwater management and current efforts to achieve measurable progress toward sustainable management;
- A set of key Findings; and
- A package of seven policy Recommendations intended to lead to a new state policy for meaningful, measurable improvement in groundwater management within realistic timeframes.

The Recommendations in this report reflect the best judgments of CWF about what is needed to achieve sustainable groundwater management while keeping decision making primarily at local and regional levels. CWF remains committed to a constructive public discussion about this critical issue and, ultimately, to meaningful legislative and policy actions.

STAKEHOLDER DIALOGUE PROCESS

PURPOSE OF DIALOGUE PROCESS

Over the past year California has seen the highest level of interest in groundwater management in nearly four decades. Problems with the current system of groundwater management are widely acknowledged, and discussions of possible solutions have been initiated in different forums. The Dialogue's objectives were to gather diverse input from knowledgeable stakeholders and members of the public about the context of the problem, develop and test ideas for improved management and reform, and ultimately develop a set of recommendations reflecting integration of key interests wherever possible. CWF sought participation from water agencies and associations, natural resource conservation advocates, environmental justice advocates, county representatives, representatives from the agriculture industry, farm bureaus, water quality advocates, and legislative and administrative officials.

Problems with the current system of groundwater management are widely acknowledged

The Dialogue did not pursue consensus-building towards unanimous agreement about solutions, but rather focused on identifying and understanding each stakeholder's full range of opinions, concerns, and ideas. Stakeholders provided critiques and recommendations based on their individual experience and expertise, but were not asked to formally represent their organizations or broader constituencies in order to maximize flexibility and openness in discussions and allow CWF to carry out an ambitious schedule.

DIALOGUE DETAILS

The Dialogue encompassed three distinct but related tracks, each intended to converge around preparation of this report. One track involved a Steering Committee of 13 stakeholders from a wide range of organizations, each having diverse expertise and perspectives (a membership list is in the Appendix). The Steering Committee members met in person three times over the course of six weeks (February 28, March 17, and April 9) at the CWF offices in Sacramento. Steering Committee members worked with each other and the CWF team to identify key issues, needs, potential solutions, and policy recommendations for the report. Steering Committee members reviewed a final draft version of the report in late April and provided comments to CWF in a series of individual telephone conversations.

A second but related track involved scheduling and conducting five Interest Group (IG) sessions, with one or more Steering Committee members participating in each session and assisting with identification of participants. The IG sessions were intended to extend the reach of the Dialogue and engage with knowledgeable stakeholders and organizations representing diverse geographies, economies, industries, and perspectives. The IG sessions were organized around conservation organizations, the environmental justice community, county representatives, agricultural groups, and water agencies. Each IG session offered options for in-person and remote participation via webinar and telephone. Each IG session also followed a consistent agenda and sought to explore the context for sustainable groundwater management in California and gather insight, feedback, and advice on approaches and solutions.

A third Dialogue track involved numerous one-on-one or small group meetings to address specific groundwater issues.

CWF found a notable level of convergence across the three tracks around the following concepts and proposals that are more fully developed in the Recommendations section of this report:

- Groundwater should be managed sustainably.
- Groundwater should be managed as part of a broader integrated approach that includes surface water, conservation, water quality, reuse, environmental stewardship, and other water management strategies.
- Groundwater should be managed at the level of existing subbasins and not based on political boundaries.
- Groundwater management is best accomplished at the local and regional level within a statewide framework.
- Groundwater management must respect private property and water rights.
- Water quality is an integral part of sustainable groundwater management.
- There is an important role for the state in providing technical assistance and carefully defined oversight.
- There is a need for continuous, reliable state, local, and regional funding as part of a plan for sustainable groundwater management.
- Groundwater management activities should be transparent and inclusive. Groundwater information should be publically accessible and management should incorporate meaningful stakeholder engagement.
- Land use decisions impact and are impacted by water management decisions. Better coordination is necessary while still respecting existing authorities.

CWF also found a diverse set of solutions proposed by stakeholders to address the following issues:

- The degree and adequacy of representation of disadvantaged communities affected by groundwater decision making.
- The relationship of new groundwater management authorities to the authorities of existing land use and water management entities.
- The potential role of the State Water Resources Control Board (SWRCB) in oversight and enforcement of a state groundwater program, including concerns about over-reaching, micro-management, and lack of appreciation for local challenges.
- The treatment of fractured rock aquifers that have different physical characteristics from alluvial aquifers and require different management approaches.
- The challenges associated with providing continuous and reliable funding for a state program and avoiding the creation of unfunded mandates.
- The potential for continued reductions in surface supplies from climate change and environmental protection to exacerbate groundwater overdraft and its impacts.

OTHER CONCURRENT PROCESSES

CWF's Dialogue benefited significantly from the Brown Administration's *California Water Action Plan* along with multiple additional groundwater management initiatives by the State Legislature, the Administration and SWRCB, and Association of California Water Agencies (ACWA).

- The Legislature held two oversight hearings, the first for the Assembly Committee on Water, Parks, and Wildlife on March 11, 2014 (entitled "Management of California's Groundwater Resources"), and the second for the Senate Committee on Natural Resources and Water on March 18, 2014 (entitled "Managing California's Groundwater: Issues and Challenges"). CWF leadership and several Steering Committee members testified at these hearings.
- The Administration held workshops on March 24 and April 16, 2014, to gather input on a groundwater legislative proposal as requested by Governor Brown. SWRCB separately prepared and received public comment on a "Groundwater Workplan Concept Paper" and held a public workshop on January 22, 2014.
- ACWA undertook an extensive groundwater management policy process in recent years and issued important documents in 2009 and 2011. ACWA released their more recent "Recommendations for Achieving Groundwater Sustainability" report on April 7, 2014.
- Links to other concurrent documents and processes may be found on SWRCB's website.

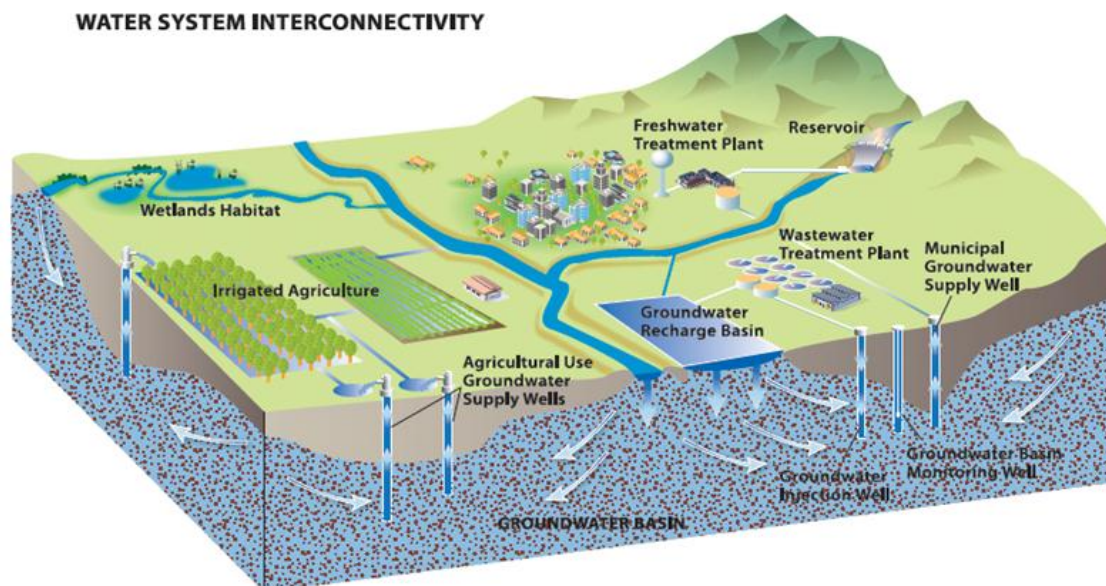
BACKGROUND AND CHALLENGES

Groundwater provides about 40% of California's water supply during an average year, and likely up to 60% or more during droughts such as this year. An estimated 30 million Californians, more than three quarters of the state's population, receives at least part of their drinking water from groundwater. Groundwater is critical to California's vibrant and diverse agricultural economy. The annual use of groundwater varies significantly depending on weather conditions and the availability of surface water supplies. Groundwater use in California is increasing, and demand is projected to accelerate in the future as the state's population surges from its current 38 million to over 50 million by 2049. Volatility of available surface water supplies due to the impacts of climate change and environmental protections is increasing pressure on groundwater. Some indications are that during this current drought groundwater may be providing 65% of the state's water supply.

Groundwater and surface water are closely interconnected parts of California's water management system, as shown in the illustration below. Groundwater use is affected by surface water availability, and surface water flow can be diminished by groundwater pumping. While groundwater issues must be addressed, that should occur within the context of the water system.

Groundwater is critical to California's vibrant and diverse agricultural economy

Finally, the physical, economic, and social dimensions of groundwater in California are remarkably diverse. The consequence is that management historically has been implemented at the local level. The unique characteristics of each place, and the local consequences of decision making, necessitate strong local authority and management. However, local jurisdiction is fragmented among different entities and does not correspond well to natural groundwater boundaries. The state also has a responsibility for managing this important resource to protect broad interests in the environment, economy, and public health and safety.



HISTORY OF GROUNDWATER DEVELOPMENT IN CALIFORNIA

Groundwater was historically an abundant and accessible resource in California that played a fundamental role in the development of the state. Artesian wells were once abundant where the city of San Jose stands today and groundwater was critical to the initial development of agriculture in the San Joaquin Valley. Even after large surface water projects were built groundwater played a role as a buffer when surface supplies were limited, helping California farmers and cities weather the effects of the droughts that are a part of the state's natural climate.

In 1914 California adopted a legal framework that included a system for permitting and managing individual rights to surface water. A system for permitting groundwater was not a priority at that time, and that basic framework has been maintained to the present. As a result, overlying land owners are permitted to pump as much water as they can reasonably and beneficially use, and no one has responsibility or authority to keep track of that pumping. This contributes to significant fragmentation of water management: each pump operator can make decisions independent of the conditions in the basin or actions of other pumpers. When disputes among pumpers arise the primary avenue available to them usually is the courts. Judges may be asked resolve who has rights to how much water within an aquifer among thousands of pumpers. Twenty three basins, mostly in Southern California, have been adjudicated in this way. The advantage of these adjudications is that the overlying landowners have certainty and understanding about their groundwater rights. The price for that certainty is quite high, with proceedings taking as long as 20 years to resolve and requiring millions of dollars in fees for attorneys and experts.

In 1978, Governor Jerry Brown empanelled a Governor's Commission to Review California Water Rights Law (available on CWF web page). Although the authors were charged with exploring possible changes to the water rights system, they opted to retain the basic framework described above and address a few specific deficiencies rather than advocate dramatic changes. Notably, the Commission's proposed changes to groundwater management anticipate many of the recommendations outlined in this report.

GROUNDWATER MANAGEMENT ISSUES

While groundwater management is a complex subject involving experts in geology, engineering, economics, and ecology, the primary management task boils down to a simple concept of balancing long-term supply and demand. Groundwater basins are like shared bank accounts. These accounts are closely tracked in some subbasins. In other subbasins, however, withdrawals are not monitored or measured.

The result over time has been overdraft in many subbasins. The University of California Center for Hydrologic Modeling estimates that between 2003-2010, the state's groundwater overdraft averaged almost 2.5 million acre-feet per year, and more than triple that amount (nearly 8 million acre-feet per year) in 2012 (a dry year) and 2013 (a critically dry year). This overdraft is, in many respects, a "tragedy of the commons:" the accumulation of what could be viewed individually as benign actions, i.e., small amounts of pumping, that has broad impacts extending beyond individual pumpers.

Chronic overdraft of groundwater resources has potentially devastating consequences, including:

Land Subsidence - Groundwater pumping creates the potential for deformation of the land surface, leading to a sinking or settling of the land known as subsidence. Some of the more costly consequences of subsidence include:

- Increased coastal and inland flooding
- Reduced conveyance capacity of canals, aqueducts, and flood bypass channels
- Damage to buildings, roads, bridges, pipelines, levees, wells, and other infrastructure
- Development of earth fissures, which can damage surface and subsurface structures and allow for contamination from the surface to enter shallow aquifers

During the 1960s and 1970s, parts of the Central Valley experienced a drop of more than 25 feet due to groundwater pumping. Occurrences of land subsidence have been discovered in many areas across the state, costing billions of dollars to the federal and state government, farmers, irrigation districts, and local agencies to repair. Subsidence continues in many of these areas as discussed in “Land Subsidence from Groundwater Use in California” *LSCE, Borchers & Carpenter (2014)*, sometimes at near historically high rates.

Increasing energy costs – Overdraft has caused groundwater levels to drop hundreds of feet in certain areas of the state. As groundwater levels drop, water users must pump from greater depths, increasing energy used to operate pumps and thereby increasing costs and greenhouse gas emissions.

Water quality degradation - Overdraft can damage water quality through a variety of mechanisms. It can allow saltwater intrusion, as has occurred in Pajaro Valley, the Central and West Coast Basins, and elsewhere, or draw in adjacent plumes of pollution. The interconnection between surface water and groundwater means that contamination in one may migrate to the other. Ironically, by over pumping groundwater to meet a current need, water users may be contaminating the aquifer and effectively reducing their future groundwater supplies.

Streamflow depletion impacts on surface water rights and ecosystems - Many aquifers naturally release water into surface water bodies. When groundwater is depleted the aquifer may instead draw from adjacent or connected surface water bodies like lakes, rivers, streams and wetlands; this reduces streamflows and lake levels. Streamflow depletion impacts surface water right holders, degrades aquatic habitats and harms the flora and fauna that depend on these habitats. For example, partly due to groundwater overdraft, the lower Cosumnes River recently has been completely dry throughout most of the salmon migration period and impacting surface water flows into the Delta.

The recommendations will allow California’s diverse groundwater users and managers to balance supply and demand, protect private property rights, and meet the future needs of farms, cities, and the environment

MOVING FORWARD

Groundwater is a critical component of California’s water system and its sustainable management is vital to present and future generations. Historic challenges with sustainable management are complicated by a growing population, a more volatile and uncertain climate, uncertainty around surface water deliveries, and changes in land use practices. This Report’s recommendations are organized around a clear goal of sustainable management and support for effective local management within a state framework. The recommendations will allow California’s diverse groundwater users and managers to balance supply and demand, protect private property rights, and meet the future needs of farms, cities, and the environment.

KEY FINDINGS TO SHAPE CHANGE IN GROUNDWATER MANAGEMENT

CWF's extensive outreach has revealed a high level of interest and sense of urgency for addressing groundwater management challenges. The effectiveness of groundwater management varies widely throughout the state, with some basins being managed sustainably while others suffer chronic overdraft and even land subsidence. As noted earlier in this report, groundwater use without broadly effective management has become a classic example of a "tragedy of the commons" or a "race to the bottom." There is general agreement that all parts of the state would benefit from better tools and authorities to effectively manage the resource and that a statewide framework can provide a clearer path to groundwater sustainability. CWF's assessment also shows a need for a delicate but clear balance between local empowerment and management and state engagement. However, there is a surprising level of agreement that groundwater can and should be managed at the local level within a statewide framework.

The following key findings have emerged from the Dialogue and should be considered in developing a groundwater management strategy.

Groundwater is essential to California's economy, environment, and public health and safety.

There is broad appreciation for the important role of groundwater in the economy and environment. Groundwater is an effective drought buffer, providing great flexibility in the face of volatile surface water supplies. It is also an integral part of the conjunctively managed long-term water supply in many areas. However, the long-term increase in overdraft and its associated problems put the economy at risk and threaten the health of ecosystems. Climate change and reduction in surface supplies as a result of environmental protections magnifies these threats and increases the urgency of adopting improved authorities and tools to support sustainable management.

Current groundwater trends are not sustainable. Numerous groundwater subbasins are experiencing accelerated groundwater level decline, renewed subsidence, impacts to surface water supplies, and reduced water quality. Other subbasins that lack programs to monitor groundwater and management structures to support sustainable use are at risk of experiencing these same problems. Demand is hardening as a result of new developments and the conversion from annual to perennial crops. Surface supplies are less and less certain due to climate change, market competition, and regulatory changes, which results in increased reliance on groundwater. These trends, if they continue, could lead to significant economic, social, and environmental harm.

Integrated water management is necessary. It is artificial and unreasonable to think about the management of groundwater separately from other parts of the water system. Changes to surface water supply allocations and diminished reliability are driving many water users toward an increasing reliance on groundwater. Effective groundwater management will require improvements to many other aspects of water management in order to increase the supplies available for recharging groundwater basins, or to use in lieu of groundwater supplies such as surface storage, water use efficiency, and water recycling. Barriers to recharging groundwater basins, ranging from surface water rights to public health concerns over the water quality of waters to be recharged, have inhibited more integrated water management. While the state wrestles with proposals to improve groundwater management, local, state, and federal leaders need to consider and make adjustments to interrelated components of water management and infrastructure to move wet-year water into groundwater storage for use during drought conditions.

Groundwater is most effectively managed at the local and regional level. California's 515 groundwater basins and subbasins are not uniform in their physical, social, economic, and political characteristics. These differences are significant and include the nature and availability of other water resources, composition of local economies, and governance arrangements for water resources. Local groundwater management that is consistent with a set of clear state guidelines is likely to receive support and achieve progress. Local management plans can be tailored to reflect local conditions based on local knowledge. State guidelines should accommodate a range of governance arrangements and provide a range of tools for use by Local Groundwater Management Entities (LGMEs).

Local groundwater management entities (LGMEs) require better tools. While some local agencies have done remarkably well with the limited authorities available, the increasing demand for groundwater and continued overdraft in key subbasins require a more focused approach to sustain groundwater resources and prevent conflict. While over 200 groundwater management plans (GMPs) have been established under current law, the long-term overdraft of groundwater in key areas of the state has continued. Creation of such plans has been a positive step, but there is a critical lack of compliance and enforcement authorities and tools for local entities. Adjudicated basins and special act districts have demonstrated successful management, but arriving at those outcomes has proved costly and can take significant time to implement, sometimes decades. In the case of adjudication, courts play a significant role in ensuring enforcement. Better authorities and tools at the local level are needed to support better management.

Better authorities and tools at the local level are needed to support better management

Protection of private property and water rights is imperative. While California water law is complex and the system of correlative rights for groundwater cannot be fully addressed in this Report, it is important that the effort to improve groundwater management respect and protect private property and water rights. In fact, one of the most persuasive arguments for improving the current management system for groundwater is to prevent the exercise of one person's rights from infringing on the exercise of another's. Better understanding of the physical elements of groundwater basins and clearer authorities for management and resolution of disputes can contribute to greater certainty over and protection of individual rights to groundwater.

Clear and meaningful state roles are needed to protect state interests in groundwater management. Most GMPs created under current law include only limited tools to address growing demand for groundwater. The current drought increases both demand and the potential for conflicts. A clear statewide framework with adequate local tools and authorities, combined with state assistance, monitoring, oversight and appropriate enforcement, can buttress good management intentions and improve prospects for achieving sustainability.

Groundwater is an important source of drinking water. An estimated 30 million Californians, more than three quarters of the state's population, receives at least part of their drinking water from groundwater. Effective management is critical to protect and maintain both the amount and quality of those supplies.

Time is an important factor. Overdraft conditions that are the result of decades of overpumping will require significant time to bring into balance. Uncertainty around climate and surface water supplies may extend those timeframes. To be effective, a groundwater management program

should provide sufficient time for the formation of LGMEs that reflect local conditions. It should also provide sufficient time and resources to support development of local GMPs with measurable objectives. In order to ensure progress toward sustainability, however, plans and objectives should include clear timeframes and deadlines.

Funding is needed to support sustainable groundwater management. LGMEs will require funding to prepare and implement GMPs. State agencies will need funding to provide technical assistance, oversight, and enforcement to support sustainable groundwater management. Funding also will be needed to support infrastructure construction, including facilities for conjunctive water management. A funding strategy that is reliable and continuous, and includes multiple sources at the local and state levels, is needed.

Access to information is important for management and citizen understanding. Good, reliable data is vital for local, regional, and state management decisions. It is also vital for explaining groundwater's role in the water system and the fundamental importance of groundwater to the state's economy, public health, and environment. There is a clear need for collection and access to useful information to ensure transparency about how decisions are made and funds are used. There must be greater two-way engagement with interested stakeholders and representative governments around establishment of management objectives, development and implementation of GMPs, and achievement of goals and objectives.

Comprehensive legislation is necessary. Existing fragmented management and limited authorities are insufficient to address the complex groundwater management challenges. A comprehensive package of authorities and standards is necessary.

RECOMMENDATIONS

THE SEVEN RECOMMENDATIONS IN THIS SECTION ARE THE KEY ELEMENTS OF A SUSTAINABLE GROUNDWATER MANAGEMENT PROGRAM. THEY ARE:

1. ADOPT A DEFINITION OF SUSTAINABLE GROUNDWATER MANAGEMENT
2. DEVELOP A PRIORITIZED STATEWIDE PROGRAM COVERING ALL SUBBASINS
3. ESTABLISH LOCAL GROUNDWATER MANAGEMENT ENTITIES
4. PROVIDE LGMEs WITH SUFFICIENT GROUNDWATER MANAGEMENT AUTHORITIES
5. REQUIRE LOCAL SUSTAINABLE GROUNDWATER MANAGEMENT PLANS
6. ESTABLISH A CLEAR AND COORDINATED STATE ROLE FOR ASSISTANCE, OVERSIGHT, AND ENFORCEMENT
7. PROVIDE FUNDING FOR GROUNDWATER MANAGEMENT

WHILE EACH RECOMMENDATION ADDRESSES A DISTINCT ELEMENT OF THE PROPOSED PROGRAM, THE ELEMENTS ARE INTERRELATED AND SHOULD BE CONSIDERED AS A SINGLE PROGRAM AND POLICY PACKAGE.

EACH RECOMMENDATION INCLUDES A RATIONALE, A DISCUSSION, AND CWF'S UNDERSTANDING OF THE RANGE OF VIEWS, INCLUDING SUPPORT AND CONCERNS, EXPRESSED BY STAKEHOLDERS DURING THE DIALOGUE PROCESS.

RECOMMENDATION #1: ADOPT A DEFINITION OF SUSTAINABLE GROUNDWATER MANAGEMENT

Recommendation: It should be the policy of the state that groundwater be managed sustainably, and state law should adopt the following definition for sustainable groundwater management to serve as the primary objective for local GMPs in each subbasin:

Sustainable groundwater management means the management of a groundwater subbasin to provide for multiple long-term benefits without resulting in or aggravating conditions that cause significant economic, social, or environmental impacts such as long-term overdraft, land subsidence, ecosystem degradation, depletions from surface water bodies, and water quality degradation, in order to protect the resource for present and future generations.

Rationale: *A clear definition of sustainable groundwater management that is capable of meeting the economic, environmental, and social needs of each subbasin is an essential element of the foundation for a statewide program. In recognition of the tremendous geographic and economic diversity of the state, this definition avoids prescribing numeric criteria that would apply to all subbasins but instead provides LGMEs a basic framework to follow. This definition is proposed to help address the variety of unique challenges around the state, and to prevent future problems in other regions (as described in the Background and Challenges section). The definition of sustainable groundwater management should be subject to further refinement to develop clear standards and criteria for application in groundwater management plans (GMPs) and to provide opportunities for full consideration of potential impacts.*

Discussion: The concept of “safe yield” is the basis for many managed groundwater basins, including adjudicated basins. Safe yield is generally defined as the maximum quantity of water that can be withdrawn from a groundwater basin over a long period of time without developing a condition of overdraft. It is intended to maximize pumping by focusing on depletion of groundwater storage. However, safe yield typically has not addressed other factors such as water quality, land subsidence, ecosystem impacts, and surface water depletions.

In contrast to safe yield, determining sustainable yield involves understanding all components of a subbasin, including the total water entering and leaving, and changes in the amount of water stored in the subbasin including connections to surface waters. An accounting of this type is commonly called the “water budget.” Human activities such as groundwater withdrawals for municipal and irrigation purposes, and rainfall and other groundwater recharge activities, must be accounted for in the calculation of a subbasin’s water budget and corresponding sustainable yield. Sustainable yield must avoid adverse impacts to in-stream beneficial uses and also address impacts to groundwater quality.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- Stakeholders from diverse constituencies support the need to clearly define sustainable groundwater management in order to provide a consistent and fair standard across subbasins.
- Stakeholders from diverse constituencies support a definition of sustainable groundwater management that addresses impacts of groundwater overdraft including subsidence,

reduced surface water availability and reliability, diminished water quality, and aquatic ecosystem degradation. A workable definition must balance the need for clarity and precision with flexibility to accommodate local conditions and future change, and also allow time to effect change.

- The term “significant impacts,” and the characterization of impacts to be avoided generally, was a concern of some stakeholders. Developing meaningful definitions of these impacts is an important step that should be addressed in rulemaking.
- There is broad appreciation of the shortcomings of the safe yield concept, along with understanding that it is the basis for current management in adjudicated basins. Sustainable yield provides for greater integration and was generally supported as an approach to improve management. However, some stakeholders lean toward safe yield because it is a standard that has been used and is understood by groundwater managers, including its limitations.
- Some stakeholders prefer a definition with greater specificity about species recovery, including specific benchmarks to protect current beneficial uses. Others oppose any increase in specificity and are generally concerned about increasing the focus on ecosystems.
- Many stakeholders acknowledge a linkage between groundwater management and water quality, but there is a range of views about how best to achieve diverse policy and regulatory objectives.

RECOMMENDATION #2: DEVELOP A PRIORITIZED STATEWIDE PROGRAM COVERING ALL SUBBASINS

Recommendation: A program for sustainable groundwater management should apply to all groundwater subbasins. However, implementation priority should be based on the priorities identified by the Department of Water Resources (DWR) in the California Statewide Groundwater Elevation Monitoring (CASGEM) groundwater basin prioritization (December 2013 draft).

- The subbasin boundary as identified in DWR’s Bulletin 118 is the appropriate boundary for groundwater management.
- The CASGEM prioritization criteria and rankings should be used for determining the sequence of implementation of a sustainable groundwater management program. Any basin with a low or very low priority, while still included in the statewide program, should have the option to extend LGME formation and GMP creation by up to 10 years, unless there is a finding of a significant, imminent threat to the state’s interests related to groundwater in that basin.
- DWR should coordinate with the Department of Fish and Wildlife (DFW) to incorporate criteria into its CASGEM prioritization system to address subbasins that include species and ecosystems that may be particularly vulnerable to existing or future groundwater conditions. The determination of such species and ecosystems should be based on clear guidelines and criteria.

A statewide system that covers all groundwater basins is necessary to ensure uniformity and fairness throughout the state

- DWR should develop a process to modify basin boundaries in order to facilitate improved management consistent with reasonable hydrologic criteria.

Rationale: *A statewide system that covers all groundwater basins is necessary to ensure uniformity and fairness throughout the state. However, there must be a clear prioritization of basins to better focus resources and allow lower priority areas additional time. By maintaining an umbrella policy that applies to all subbasins, there will be less chance of problems migrating from a managed region to an unmanaged region.*

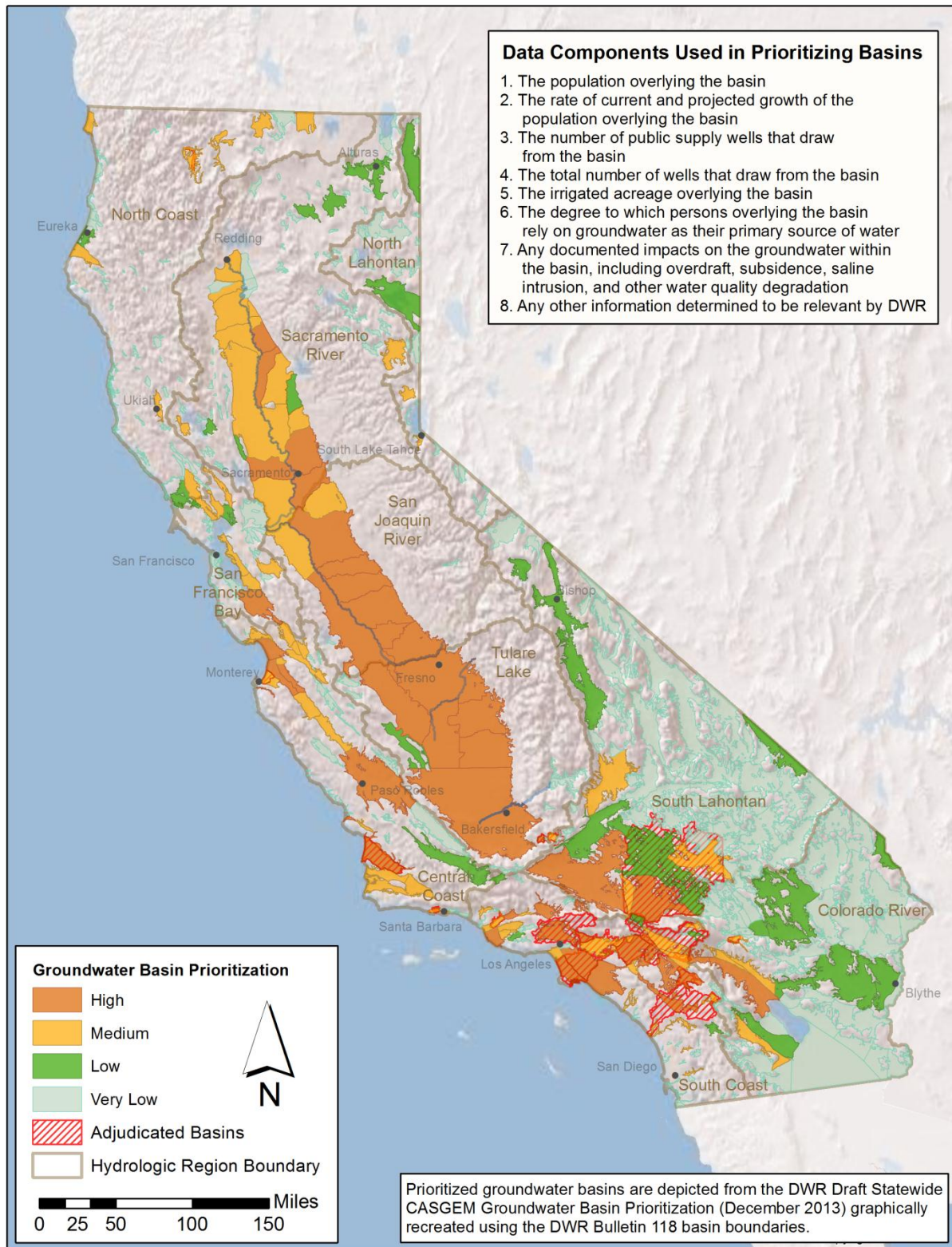
Discussion: This recommendation builds on prior legislative priorities and extensive work done by DWR to identify, characterize, and prioritize groundwater subbasins across California. It focuses on the subbasins in DWR's Bulletin 118 to ensure a consistent statewide policy. The CASGEM prioritization rankings (see CASGEM map p. 16), although still in draft form at this time, are part of this recommendation because they provide a clear system of identifying which basins are of highest priority in the state and are possibly threatened by present or future increases in groundwater demand. DWR anticipates updating these priorities at five-year intervals.

Current Bulletin 118 boundaries were identified by DWR as an appropriate basis for groundwater management in its 1980 report to the Legislature. Bulletin 118 was last updated in 2003. The 515 basins and subbasins included in the bulletin are identified on the basis of geological and hydrological conditions and, when practical, consideration of political boundaries. Bulletin 118 does not include all groundwater in the state, i.e., it excludes fractured bedrock areas that are located in many areas of the Sierra foothills.

DWR advised the Legislature that groundwater boundaries "can provide a basis for groundwater management." The Water Code already requires Bulletin 118 boundaries to be used in GMPs and urban water management plans.

DWR has extensive information about the characteristics and conditions of each groundwater basin in its Bulletin 118 database. The CASGEM monitoring system, as established in response to 2009 legislation, prioritizes all groundwater basins in one of four categories based on eight explicit criteria.

Because the state's resources are limited, attention should be focused initially on those highest priority basins (46 high priority and 80 medium priority basins) under CASGEM's rankings for 2013. It is important to include all basins in a statewide management program, but it would not be effective to treat all basins as an equivalent priority. The program should have a mechanism to review and accept existing basin management approaches that are effective and not disrupt what is working. Basins that are largely undeveloped and facing no current or near-term risks in the foreseeable future should be treated as lower priorities and subjected to relatively fewer requirements.



Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- There is broad support for the use of Bulletin 118 subbasin boundaries as they best reflect geologic and hydrologic boundaries at the appropriate scale for management, even though there are some flaws where the boundaries follow political lines.
- There is broad support for a single statewide program for sustainable management as long as it includes an acceptable system of prioritization, does not create problems where current management is effective, and does not impose significant new requirements where problems are not occurring or likely to occur. This program should extend to subbasins that have benefited from “happenstance” rather than effective management, with appropriate differences in benchmarks and schedules. Some stakeholders suggested that adjudicated basins and existing Special Act Districts could be “certified” as consistent with the program and report at regular intervals to maintain certification. These basins potentially could serve as examples of successful management practices for other subbasins.
- There is general support for a principle of “do no harm” in cases where subbasins are being effectively managed. A state program should be structured consistent with this principle. Some stakeholders predicted that subbasins currently under effective management will prefer to be left alone.
- There is broad recognition of the differences in watershed and subbasin conditions across the state. These differences should be accommodated in a single statewide program, and stakeholders generally agree that a “one size fits all” approach is not desirable.
- There is broad support for focusing attention on high and medium priority basins and setting benchmarks and other requirements that reflect a sense of urgency.
- There is broad support for inter-basin coordination, particularly from subbasins whose neighbors are creating problems that cross boundaries. This coordination is more likely to be achieved through a single state program that applies to all subbasins, with appropriate differences based on prioritization and other factors.
- There are differences in views about how to address low and very low priority basins. Some stakeholders are comfortable with an extended timeframe so long as action eventually is taken; others prefer not to set any requirements until there is a measurable negative change in conditions.
- Some stakeholders expressed concern about situations where a subbasin may be excluded from prioritization despite a significant threat to surface water supplies and reliability in the near term.

There is broad support for focusing attention on high and medium priority basins and setting benchmarks and other requirements that reflect a sense of urgency

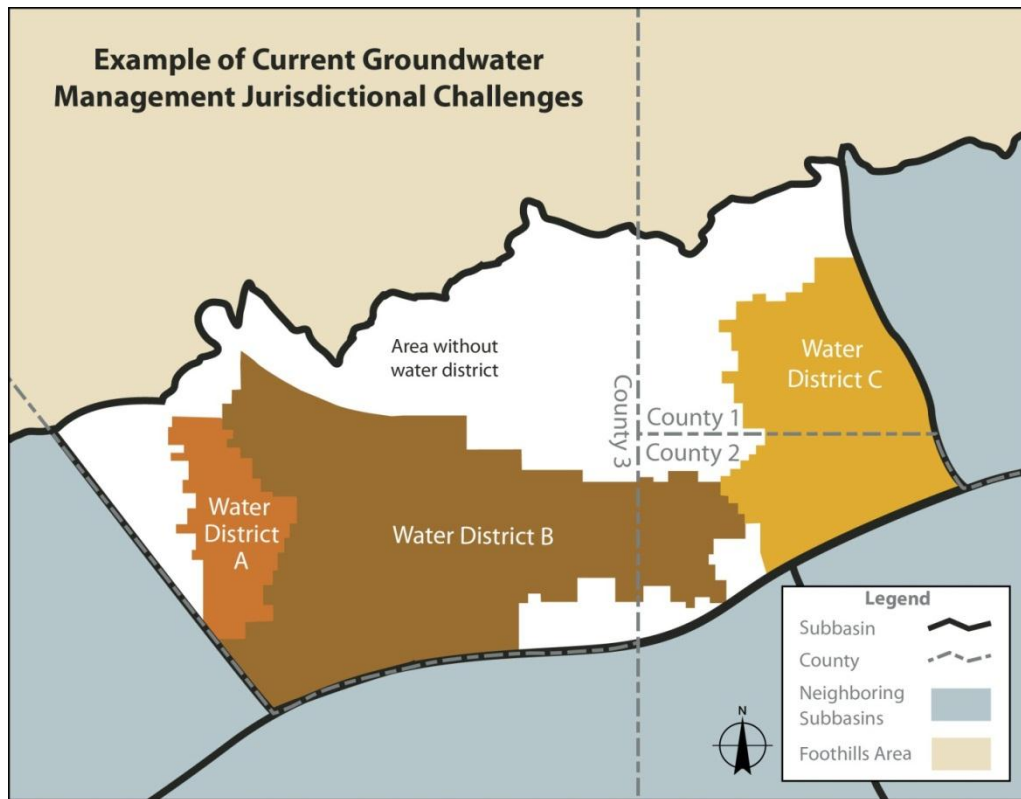
RECOMMENDATION #3: ESTABLISH LOCAL GROUNDWATER MANAGEMENT ENTITIES

Recommendation: The state program should require that LGMEs be established to manage groundwater subbasins, as follows:

- Once an LGME is formed consistent with state guidelines and the state is notified, the LGME (and implementing agencies) should have access to the full set of tools and authorities provided by the program (Recommendation 4).
- The LGME is accountable for meeting the goals of the GMP and meeting the goal of sustainable groundwater management.
- Local decision-making by LGMEs should be transparent and reflect input from stakeholders and advisory committees as appropriate.
- LGMEs should be formed within two years of the legislation's effective date. Interested parties from within the subbasin or in an adjacent subbasin may appeal the consistency of formation with state guidelines within a specified timeframe.

LGMEs should be formed through any of the following mechanisms, to allow flexibility in meeting local needs and interests about appropriate governance structures while promoting accountability for achieving program goals.

1. Existing entities may organize and coordinate through formation of a Joint Powers Authority (JPA) , to form a single LGME.
2. Existing entities may organize through a formal agreement, such as an MOU, which identifies a single LGME to develop the GMP, and clearly defines roles and responsibilities of each implementing agency in achieving sustainability goals under the GMP.
3. Under the Special District Act, citizens may petition the legislature to form a new agency that may serve as an LGME. New authority should also be created allowing citizens to form a new public agency through an administrative process, similar to the Groundwater Management Agency Act, as described by the *Governor's Commission to Review California Water Rights Law* (1978).



This example illustrates the challenge of effectively managing groundwater subbasins with multiple entities and overlapping jurisdiction. CWF's recommendations would lead to a single GMP and coordinated management for the subbasin.

It is particularly important that the guidelines for LGME formation accommodate existing management entities, arrangements, and activities that have already achieved sustainable groundwater management or are likely to achieve that goal under current practices.

This recommendation should be subject to further refinement to develop clear standards and criteria for application in groundwater management plans (GMPs) and to provide opportunities for full consideration of potential impacts. The state's role in developing criteria for LGME formation and reviewing local plans and progress reports is discussed in Recommendation 6.

Rationale: *This Recommendation supports a comprehensive and effective set of solutions to California's groundwater problems by reaffirming and establishing a primary role for local knowledge, experience, and governance structures. This approach is consistent with the existing emphasis on local water management institutions while reducing fragmentation within a subbasin. The Recommendation emphasizes local management of subbasins and provides flexibility to respond to local conditions. It avoids mandating new levels of government and promotes consistency through basic guidelines applicable to all subbasins to avoid gaps in management.*

Discussion: Historically, groundwater management has been fragmented among local, regional, and state entities due to differing authorities over water uses, water resources, geography, and land use. In some cases groundwater has not been managed at all. There is a need to have a designated

groundwater management entity that has clear and unambiguous authority to achieve sustainable groundwater management. This recommendation would address that need.

The Legislature chose to promote local groundwater management when it passed AB 3030 in 1992 and SB 1938 in 2002, codified in Water Code §§ 10750-10756. Empowering LGMEs is the most practical way to achieve effective local management. Groundwater managers and users have recognized that each groundwater subbasin is unique and functions differently based on local conditions such as hydrology, geology, land use, governance, and political will. Because locals have the detailed knowledge and expertise to address these conditions, groundwater management primarily governed and implemented by a state authority would be infeasible. A key component of this Recommendation is to allow regions, with public input, the flexibility to determine the best governance structure for groundwater management.

To address the significance of time, LGMEs must be established within two years of the effective date of legislation. The state should intervene if this timeline is not met, as described in Recommendation 6.

There is a need to have a designated groundwater management entity that has clear and unambiguous authority to achieve sustainable groundwater management

Where a subbasin is adjudicated or falls within the jurisdiction of an existing special act district for groundwater management, a LGME should be deemed to have met the requirements of this section if its plans and activities are generally consistent with this program. In other subbasins with an existing groundwater management plan, an existing entity could be designated the LGME under this recommendation so long as other requirements are satisfied.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- Stakeholders from diverse constituencies support the basic approach described in this Recommendation.
- There is broad support for allowing local flexibility in forming LGMEs and avoiding a one-size-fits-all prescription.
- There is strong interest in local autonomy among some stakeholders, accompanied by confidence that local decision makers provided with the right authorities and resources will manage groundwater sustainably without a need for primary state involvement.
- There is significant concern among some stakeholder constituencies about a lack of local political will to sustainably manage groundwater. This could emerge through failure to form an LGME, to prepare a GMP, or to meet sustainability goals. These stakeholders would support a flexible, local approach to groundwater management that includes the potential for appropriate state support and, if necessary, intervention.
- There is broad understanding among stakeholders about the importance of protecting existing property rights and water rights as part of LGME formation.
- Transparency in LGME formation and decision-making is an important interest for some key constituencies. This interest includes public access to information and is discussed further under Recommendation 5.

- There is a range of stakeholder views about diversity of representation in LGMEs. Some stakeholders feel strongly that a broad range of interests and values should be guaranteed in setting guidelines for representation, including but not limited to public health, the environment, and disadvantaged communities. Others feel that existing local approaches to formal representation should be respected. There is frustration among some stakeholders over past uses of outside advisory panels or committees as a way of expanding participation, based on negative experiences with IRWM and other programs. One approach suggested by some stakeholders is to amend existing JPA law to expand the types of organizations permitted to participate.
- Some stakeholders pointed out that two years may not be sufficient time if Local Area Formation Commission involvement is required under state law.

There is broad support for allowing local flexibility in forming LGMEs and avoiding a one-size-fits-all prescription

RECOMMENDATION #4: PROVIDE LGMEs WITH SUFFICIENT GROUNDWATER MANAGEMENT AUTHORITIES

Recommendation: State law should provide clear and unambiguous authorities to LGMEs that enable them to achieve sustainable groundwater management. LGMEs have the option to utilize a range of authorities depending on local circumstances. These LGME authorities should include:

- **Measuring and Reporting on Groundwater Conditions.** The LGME should have the authority to require monitoring and reporting of data needed for effective groundwater management planning, implementation, and enforcement. This authority should include reporting of groundwater withdrawals, groundwater use, and groundwater elevations. CASGEM and other state groundwater monitoring programs should be integrated with any new authorities to measure and report on groundwater conditions.
- **Allocating Groundwater and Managing Pumping.** The LGME should have sufficient authority to allocate the beneficial use of groundwater and control pumping within a subbasin to achieve sustainability goals and resolve conflicts between property rights. One concept currently under development that may facilitate groundwater allocation is the establishment of an administrative adjudication process under the direction of the LGME and/or the SWRCB.
- **Assessing Fees.** The LGME should have the authority to assess fees to pay for costs of organizing, planning, and implementing its GMP (Recommendation 8).
- **Allowing and Approving Voluntary Groundwater Transfers within Subbasin Jurisdiction.** The LGME should have authority to approve transfers. This authority should work in conjunction with allocation and pumping control authorities to provide flexibility to find physical solutions.
- **Enforcement.** The LGME should have clear authority to enforce compliance with a GMP, including enjoining actions and imposing penalties.

The LGME should have the authority to require monitoring and reporting of data needed for effective groundwater management planning, implementation, and enforcement

Land use planning should remain under the jurisdiction of counties and cities but greater coordination and collaboration is necessary. The collaborative effort should focus on integration of and consistency of the GMP with:

- updating the General Plan and zoning ordinances;
- evaluating groundwater-intensive land use proposals; and
- issuance of well permits

Rationale: *This Recommendation is structured to give a LGME clear authority and flexibility to identify and utilize the most effective management tools to achieve groundwater sustainability, while respecting property rights and water rights and maintaining an efficient system of management. There are currently diverse interpretations of available authority. In the face of this uncertainty, local entities have been limited in their management of groundwater, particularly with respect to pumping. Clarifying these authorities would give LGMEs the tools they need to effectively implement sustainable groundwater management.*

Discussion: Authority to manage groundwater has historically been fragmented and uncertain between different types of entities and levels of governance. The groundwater subbasins that have been the most successfully managed are those where authorities have been consolidated into one entity that manages all groundwater in the subbasin. Special act districts such as the Orange County Water District and the Santa Clara Valley Water District have effectively managed the overdraft problems in their subbasins through several of the authorities listed in this section, such as pricing and measurement. Other groundwater subbasins have been adjudicated, with courts authorizing groundwater governing bodies to oversee the rights and actions taken to manage according to the terms of each adjudication. These entities that have effectively managed their groundwater basins frequently have use the authorities listed in this Recommendation. Efforts to control or allocate water rights are taken to protect the rights of one set of property owners from the exercise of another's rights.

Outside of special act districts and court adjudication proceedings, the authorities listed have not been consolidated into a general groundwater management law that grants these historically successful authorities to a specific type of governing body. Legislative acts such as AB 3030 and SB 1938 omitted some of these key authorities or instituted them with such a high bar to implementation that they have not yet been tested. This approach recommended in this Report empowers a LGME with the clear and necessary authorities listed in this Recommendation to achieve sustainable groundwater management.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- Stakeholders from diverse constituencies support the basic approach described in Recommendation 4. As with other recommendations, stakeholders support local flexibility to decide which authorities to employ so long as sustainability is the goal.
- There is broad recognition among stakeholders that the authorities in AB 3030 are not strong enough to effectuate meaningful progress toward sustainable management.

- The greatest concerns with local groundwater management authority focused primarily on Recommendation 3 regarding the organization, representation, and transparency of LGMEs. There was general consensus that once the appropriate LGME was formed, that entity would need stronger and clearer authorities.
- Some stakeholders have doubts about the willingness or capacity of LGMEs to use new authorities and tools without the potential for state enforcement.
Some constituencies are likely to resist specifying any authority to control pumping as part of sustainable groundwater management.
- Some stakeholders are concerned that LGME authority to approve groundwater transfers will be used to facilitate inter-basin transfers and prefer that this authority be limited to approving intra-basin transfers as part of a conjunctive management program.
- As noted elsewhere, stakeholders generally appreciate that private property rights must be respected in the exercise of local authorities.
- Local land use agencies expressed a concern that imposing restrictions to be consistent with a GMP might be viewed by some as a “taking” of private property, and raised the possibility of indemnification against such a claim.
- Some stakeholders emphasized the importance of having experienced water and groundwater managers exercising new authorities for LGMEs.

RECOMMENDATION #5: REQUIRE LOCAL SUSTAINABLE GROUNDWATER MANAGEMENT PLANS

Recommendation: Each LGME should be required to develop a Groundwater Management Plan (GMP) that describes how that entity will achieve sustainable groundwater management in each subbasin within its jurisdiction.

- A GMP should include the components currently required and commonly referred to as SB 1938 plans (Water Code § 10753.7). The objective of the GMP should be the achievement of sustainable groundwater management through demonstrated, measurable progress. In addition, the GMP should contain the following:
 - Discussion of the geographic boundaries (Recommendation 2) with related mapping of features that impact groundwater management.
 - Identification of physical interactions and impacts across subbasin boundaries that reflects coordination with adjacent subbasins.
 - Subbasin water budget, model, water supply, and demand forecast; and a plan for long-term basin sustainability that addresses long term overdraft, water quality, subsidence, surface water flows, and groundwater dependent ecosystems.
 - Interim milestones and final targets with measurable thresholds that demonstrate progress toward achieving sustainable groundwater management should be identified for each objective component of the Plan (the interval for each milestone should be no longer than every five years).
 - Description of water management strategies for achieving sustainability of the groundwater subbasin, including how the groundwater management is part of a

broader integrated approach that includes surface water, conservation, reuse, and other water management strategies.

- Other components that the LGME may require in order to meet sustainable groundwater management objectives, including those items listed in Water Code § 10753.8.
- DWR should provide technical and financial assistance in the development of local GMPs.
- A local GMP should have the following performance dates for high and medium priority subbasins (Recommendation 2):
 - The GMP should be completed and published within four to five years of the effective date of legislation.
 - Progress reports should be required every five years to identify progress made towards five-year interim milestones identified in the GMP.
 - Final achievement of sustainable groundwater management objectives should be reported and evaluated no later than 20 years from the date of plan adoption.
- LGMEs for low and very low priority subbasins should have the option to prepare GMPs up to ten years later than the requirement for high or medium priority subbasins. Milestones and final targets should be correspondingly adjusted. As noted in Recommendation 2, this option should be subject to a finding of a significant, imminent threat to the state's interests related to groundwater in such a subbasin.
- The LGME should report to SWRCB that its GMP meets the required criteria. SWRCB should have the authority to request DWR to review selected GMPs to ensure they meet criteria for a sound and credible plan that meets sustainability milestones and targets over the 20 year period. An interested party from within the subbasin or an adjacent subbasin should have an opportunity to formally challenge the compliance of a GMP with program requirements.

Rationale: *The GMP is the primary mechanism for achieving sustainable groundwater management. The new components listed in this Recommendation are identified to ensure that there is sufficient time for a LGME to prepare and implement the plan to achieve sustainability, and to work in an integrated manner with other local management entities in a subbasin. The milestones, targets, and progress reports are required to ensure that progress is being made throughout the 20 year implementation period, and to help the LGME identify any changes in information or conditions that would require revisions to the GMP.*

Discussion: Although impacts can sometimes come on quickly, groundwater generally responds slowly to changes in management, particularly when trying to arrest declines or achieve recovery in aquifers. It is therefore important to have clearly defined but flexible milestones for measuring performance toward achieving the goal of sustainable groundwater management.

This Recommendation lists elements that should be required in GMPs. The basis for these elements is grounded in the requirements of previous legislation (SB 1938, Machado 2002), codified in Water Code §§ 10753.7 – 10753.8. New requirements have been added to track progress in meeting sustainability objectives. GMPs should include measurable targets to track performance within discrete time periods. For high and medium priority basins, a reasonable time period is five years. With measurable milestones and targets and progress reports, GMPs will be periodically updated to

respond and adapt to unforeseeable changes in conditions. Where changes in conditions significantly affect the course of action identified in the plan, extensions can be requested to revise target timeframes. GMPs and progress reports would be made publically available. Opportunities for the state to provide time extensions are identified in Recommendation 6.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- There is general agreement among stakeholders that regions will need significant time and resources to develop and implement sustainable GMPs. There is concern that imposing short timeframes to meet sustainability objectives in subbasins facing serious overdraft or other significant groundwater problems may cause economic harm or missed benchmarks. It will take time to get through the complex process of planning, data development, and adoption of new water management strategies.
- Some stakeholders advocate linking GMPs to Urban Water Management Plans required under state law.
- There is broad agreement that a GMP needs to be substantive and act as a real instrument for implementation actions. Stakeholders expressed a range of views about the relative importance of reporting requirements for different criteria such as water quality or subsidence.
- There is general support for local GMP development and adoption, followed by notification to the state. There are different views about the relative level of state oversight to ensure compliance of GMPs with program requirements, although likely greater agreement about focusing oversight on high priority subbasins. While local flexibility to select management measures is critical, stakeholders generally agreed that GMPs should have specific milestones to reach sustainability and targets for eliminating overdraft.
- There is interest among some stakeholders in having the flexibility to “merge” or integrate existing groundwater management plans that may cover only a portion of a subbasin into a single GMP. One option could be the use of “units” within a GMP.
- Stakeholders offered a range of views about the collection and reporting-including public access-of groundwater management data. There appears to be broad support for collecting and making available basic information in aggregated form. There are significant differences about the collection and reporting of information for individual wells. Some stakeholders seek the public release of individual well data, which would require changes to current law. Others strongly oppose any such change. Public access to data and assumptions incorporated into models is also important for some stakeholders. In addition, some stakeholders advocate for more frequent reporting of basic GMP information, possibly through annual “progress updates” prepared and issued by LGMEs.

There is general agreement among stakeholders that regions will need significant time and resources to develop and implement sustainable GMPs

RECOMMENDATION #6: ESTABLISH A CLEAR AND COORDINATED STATE ROLE FOR ASSISTANCE, OVERSIGHT, AND ENFORCEMENT

Recommendation: The state should support sustainable groundwater management through coordinated activities by SWRCB and DWR in four areas: technical information and assistance, program oversight, enforcement, and regulatory relief. These activities are addressed below in separate recommendations. The state's important role in providing financial assistance is addressed separately in Recommendation 7.

Recommendation 6.a: Technical Assistance. DWR should have primary responsibility for management of groundwater information that can track progress of groundwater basins statewide, and to support LGMEs in implementation of sustainable groundwater management. This includes

Technical Assistance to LGME's should include but not be limited to, gathering and analyzing data, developing and implementing GMPs, monitoring, and measuring progress toward GMP milestones and goals, inter-basin coordination, subbasin characterization, water budgets, modeling, , and monitoring.

- DWR should develop a list of Best Management Practices (BMPs).
- Technical assistance should be prioritized initially among high priority subbasins.
- Statewide data management should include but not be limited to:
 - Reporting on statewide groundwater basin status based on a compilation and assessment of the data from GMPs and progress reports, and
 - Establishment of a subsidence monitoring and assessment program, in coordination with the U.S Geological Survey, to avoid potential costly impacts of subsidence. This includes development of new data in targeted regions, and coordination of existing fragmented data.

Recommendation 6.b: Program Oversight and Compliance. SWRCB and DWR should work cooperatively and share data to oversee compliance with program benchmarks and targets.

- SWRCB and DWR should create and manage their respective information systems but share data to support program oversight.
- LGMEs should submit required notifications and reports to the state on:
 - LGME formation
 - GMP development and adoption
 - Progress towards milestones every five years, and
 - Achievement of final goals and objectives identified in the GMP
- DWR should review and analyze LGME reports and prepare summary analyses for SWRCB regarding compliance with program requirements, including progress toward sustainable management. DWR should also coordinate with SWRCB regarding the need for and nature of enforcement actions, as described below.

- SWRCB, in coordination with DWR, should establish standards and procedures, to support evaluation of compliance with program requirements, and progress toward sustainable management. This should include:
 - Setting standards to guide subbasin notification of LGME formation and GMP adequacy, as well as an auditing process to evaluate compliance with program requirements.
 - Setting monitoring requirements, including data collection, acceptable metrics and methodologies, and reporting frequency, to track groundwater quantity and quality milestones and targets outlined in Recommendation 5.

Recommendation 6.c: Enforcement. SWRCB should have clear and unambiguous authority to enforce compliance with program requirements, and should be required to establish clear procedures for exercising this authority. A LGME (or entities in a subbasin) should have sufficient opportunity to satisfy program requirements, and appropriate support including technical assistance, before any enforcement action by SWRCB.

- SWRCB should take enforcement action after making a finding of non-compliance in coordination with DWR.
- SWRCB should have authority to adjust or permit exceptions to program requirements due to extraordinary local economic conditions, for emergency protection of public health and safety, or to address other extraordinary circumstances.
- SWRCB procedures should include an opportunity for a LGME (or management entities in a subbasin) to request a hearing regarding a proposed finding of non-compliance by SWRCB. Procedures should also include a formal process to appeal a SWRCB finding of non-compliance. Procedures should further include an opportunity for third parties from within a subbasin or in an adjacent subbasin to request a finding by SWRCB of non-compliance with critical program requirements.
- To the extent practical, SWRCB enforcement actions should promote the state's interest in sustainable local groundwater management. Enforcement actions should be proportional to the nature and consequences of non-compliance and gradual in the extent of state intervention. The following is one example of gradual enforcement:
 - Targeted technical assistance from DWR as appropriate
 - Notice of Noncompliance by SWRCB to region or LGME
 - Appointment of an interim water master to assist with the formation of an LGME, development of a GMP, or implementation of a GMP, until such time as the water master formally reports to SWRCB that future compliance is likely
 - Institution of emergency restrictions on new or existing wells, or other actions that address an immediate threat to public health or safety.
- In addition to these enforcement actions, proposals are being explored that would establish an administrative adjudication process managed by the SWRCB in conjunction with LGMEs. Such a proposal could reduce the time and cost of allocating groundwater resources.

SWRCB should have the flexibility to respond to unique local circumstances in its enforcement actions.

Recommendation 6.d: Regulatory Relief. A new regulatory groundwater management program should be structured to eliminate redundancies with other related programs, including reporting of groundwater levels. Reporting requirements should be streamlined to minimize burdens on LGMEs. SWRCB, in coordination with DWR, should have responsibility for identifying and implementing regulatory streamlining and efficiency.

Rationale. *These Recommendations describe a state role that primarily supports local groundwater management through technical assistance. The state's oversight and enforcement role is intended to create incentives to meet local-level program requirements, with enforcement being a final step. There is extensive flexibility available to respond to local conditions. This approach reflects the state's historic preference for local management of water resources, but addresses shortcomings in previous programs by providing a credible enforcement role. The recommendations also encourage coordination and integration at the state level.*

Discussion. Current state programs to promote effective groundwater management are inadequate. Many subbasins lack basic data and resources to adequately characterize groundwater resources, an essential first step in effective groundwater management. In addition, SB 1938 requires submittal of groundwater plans as a condition of receiving state grant funding, but it stops short of tethering credible state oversight to concrete milestones and targets to achieve groundwater sustainability. As a result, many basins that meet SB 1938 requirements nevertheless continue to be impacted by overdraft conditions. A mix of state support and effective oversight and enforcement is necessary to encourage improved management and achieve measurable progress.

The recommendations follow a pragmatic path in relying on notification of LGME formation and GMP adoption—without time consuming state reviews—in order promote timely management. DWR and SWRCB will develop procedures to review GMPs in order to promote broad compliance. SWRCB should look first at the least intrusive enforcement actions to encourage local progress.

SWRCB should have the discretion to choose from a suite of possible enforcement actions in those instances where the LGME falls short of the measurable thresholds outlined in its GMP. SWRCB should first look to the least intrusive enforcement actions to improve local progress.

Distinct roles for DWR and SWRCB, coupled with coordinated program management, are intended to draw on each agency's strengths, build confidence in the program at the local level, and identify opportunities to eliminate redundancies with current programs and regulations.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

- While there appears to be support for DWR's role in providing technical assistance, limited oversight, and funding, some stakeholders and their constituencies expressed strong resistance to meaningful oversight and enforcement by SWRCB. The reasons for this resistance are varied: preference for absolute local control, lack of confidence in evenhanded enforcement, and general resistance to any steps that could result in reduced pumping are a few.

- Some stakeholders expressed concern that SWRCB enforcement measures (e.g., bans on new wells or land use limitations) could have a severe impact on local economies and development opportunities. Others suggested such measures are necessary options in some subbasins to promote timely shifts in behavior. Some groundwater users expressed strong concern that SWRCB will intervene prematurely, before a LGME has had sufficient opportunity to meet milestones, or that intervention will not be proportional or respectful of local management efforts and practical challenges.
- There is general agreement that state oversight should not include “micromanaging” local decisions – GMP development and implementation should be left up to LGMEs, with state intervention only in the event goals are not met.
- There is broad support for periodic and transparent reporting to the state as a means to track subbasin, regional, and statewide progress towards sustainable groundwater management.
- Stakeholders expressed support for maintaining a distinction between non-regulatory (DWR) and regulatory (SWRCB) functions, while recognizing the need for credible coordination and “crosstalk” between the two state entities. At the same time, there is a fairly broad expectation that joint implementation will be challenging. Some stakeholders propose creation of a new state entity or office to oversee the program, but the majority appear to harbor strong doubts about that approach.
- There is strong support for incorporating incentives such as regulatory relief, technical assistance, and reporting flexibility for subbasins that are in balance in order to reduce local resistance to implementation.

There is general agreement that state oversight should not include “micromanaging” local decisions – GMP development and implementation should be left up to LGMEs, with state intervention only in the event goals are not met

RECOMMENDATION #7: PROVIDE FUNDING FOR GROUNDWATER MANAGEMENT

Recommendation: The state should develop and implement a multi-source funding strategy to support state and local activities for sustainable groundwater management.

- Funding would be used at the local and regional level to create LGMEs, develop GMPs, carry out activities under GMPs to achieve sustainability goals, and conduct reporting and monitoring, and to construct, operate, and maintain conjunctive groundwater management facilities including recharge basins.
- Funding would be used at the state level to allow DWR and SWRCB to provide technical assistance to local and regional entities and LGMEs based on prioritization; to gather, analyze, and disseminate program information; to regularly update Bulletin 118; and to carry out oversight and enforcement activities in support of sustainable groundwater management.
- A funding strategy should account for current, widely recognized challenges to funding local and regional groundwater management, including but not limited to Proposition 218.
- If a 2014 water bond proceeds, local assistance funding is needed to support the significant new GMP development and implementation activities associated with the sustainable

groundwater management program. In particular, funding is needed to support groundwater storage projects and associated infrastructure to convey surface water to recharge facilities.

- New local and state fees and taxes to pay for groundwater services are needed. All LGMEs should have local fee authority and the authority to measure and monitor water use to implement a fee system if they choose. Opportunities for coordination of funding among different programs should be identified as part of the state strategy.
- Funding is necessary to support the meaningful participation of underserved communities who have a stake in the management of groundwater subbasins and should be included in both state funding mechanisms and local funding programs.

A funding strategy should account for current, widely recognized challenges to funding local and regional groundwater management, including but limited to Proposition 218

Rationale: *Designing and implementing an effective statewide program for sustainable groundwater management requires funding for a range of activities including planning, monitoring, and construction and operation of physical facilities. LGMEs require continuous reliable funding sources. There currently are significant challenges to relying on water service fees or taxes at the local level for most subbasins. One of these is Proposition 218's requirement for "proportionality" of fees to services; another is the requirement for support from a two-thirds majority of voters for a tax increase. There is no obvious single source of funds to pay for groundwater management. A multi-source funding strategy that leverages existing federal and state funding sources and methods, addresses Proposition 218, and develops new funding sources is needed. Without such a strategy, local and regional groundwater management cannot succeed on a statewide scale.*

Discussion: It is beyond debate that sustainable groundwater management requires funding support for a wide range of activities. This point is made clearly in the recent SWRCB concept paper for groundwater management.

There are important differences in the authorities available to special act districts (of which there are 14) and adjudicated basins (of which there are 23) to raise funds for groundwater management and the vast majority of other groundwater entities, and other basins, around the state. Special act districts are authorized to regulate pumping and at least six have adopted pumping fees that reflect diverse approaches and pricing. However, each such district's ability to charge fees is potentially limited by its legislation: while some districts use tiered pricing, others believe they lack such authority. Management entities in some adjudicated basins charge replenishment fees for pumping in excess of court-ordered quantities, again with pricing variations. Some opportunities to trade pumping among users of adjudicated basins also exist.

It is estimated that over 200 GMPs have been prepared since AB 3030 was adopted in 1992. The prevailing view is that AB 3030 does not grant sufficient authority to other groundwater entities to adopt local fees to support groundwater management, and few, if any, local entities have adopted such fees. Local taxes can be used to support groundwater management but must satisfy the constitutional requirement of a two-thirds majority of voter support. Proportional cost restrictions in Proposition 218 are a challenge to satisfy for fee-based models. A recent appellate court opinion in *Griffith v. Pajaro Valley Water Management Agency* may provide a reliable legal foundation for adopting groundwater service fees but it is difficult to predict at this time.

The state has provided some funding to address management needs. The Public Policy Institute of California (PPIC) estimates that between 2000 and 2012, DWR made approximately \$350 million in grants and low interest loans to local entities for groundwater storage. A SWRCB list of current funding sources from the water boards and other agencies includes DWR's Integrated Regional Water Management grants program and Local Groundwater Assistance programs.

There is no shortage of ideas for raising funding for local groundwater management:

- A statewide water use surcharge has been under discussion for several years, and there were several recent legislative initiatives, but this appears unlikely to be useable. Surcharges are used at the local and regional levels.
- PPIC identifies a common fund regional model that returns tax revenues to regions that comply with criteria as one option in its March 2014 paper entitled "Paying for Water in California."
- State general obligation bonds have been an important source of funding for the past several decades.

Range of Stakeholder Views: CWF is aware of the following views regarding this Recommendation.

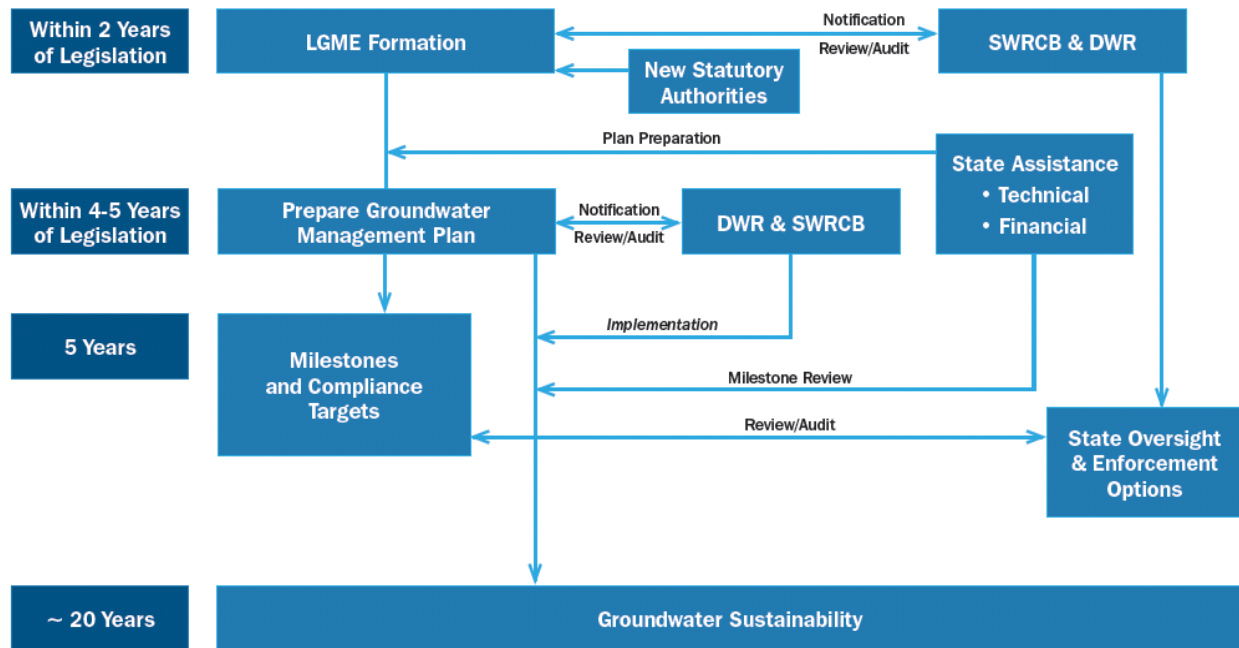
- There is broad opposition to the adoption of a statewide groundwater management program that imposes new costs, or unfunded mandates, at the local or regional level without a continuous, reliable source of funding.
- There is broad support for providing state funding for local and regional activities with minimal eligibility, application, and reporting requirements.
- Many stakeholders emphasized that funding cannot be allocated simply for GMP development but must be available for implementation.
- Stakeholders are uncertain about whether groundwater funding would be connected to current Integrated Regional Water Management, or if there should be dedicated groundwater funding.
- Most stakeholders support clear local fee authority, and there is modest support for surcharges on existing fees. Some stakeholders emphasized that fee authority should include criteria and limits, e.g., establishing initial fees, formulas for increases.
- Most stakeholders view certain provisions of Proposition 218 as a challenge to adopting local fees to support effective basin-wide management.
- Most stakeholders are aware of the shortcomings of AB 3030's fee replenishment authority approach based on actual experience since enactment of the statute in 1992.
- Some stakeholders expressed reservations about imposing local fees on groundwater pumpers specifically to address needs of disadvantaged communities, as opposed to addressing sustainable management goals. The specific purpose and justification for any such fees likely would receive considerable attention.
- Most stakeholders agree that if there is a water bond it should provide funding for the program described in this report.

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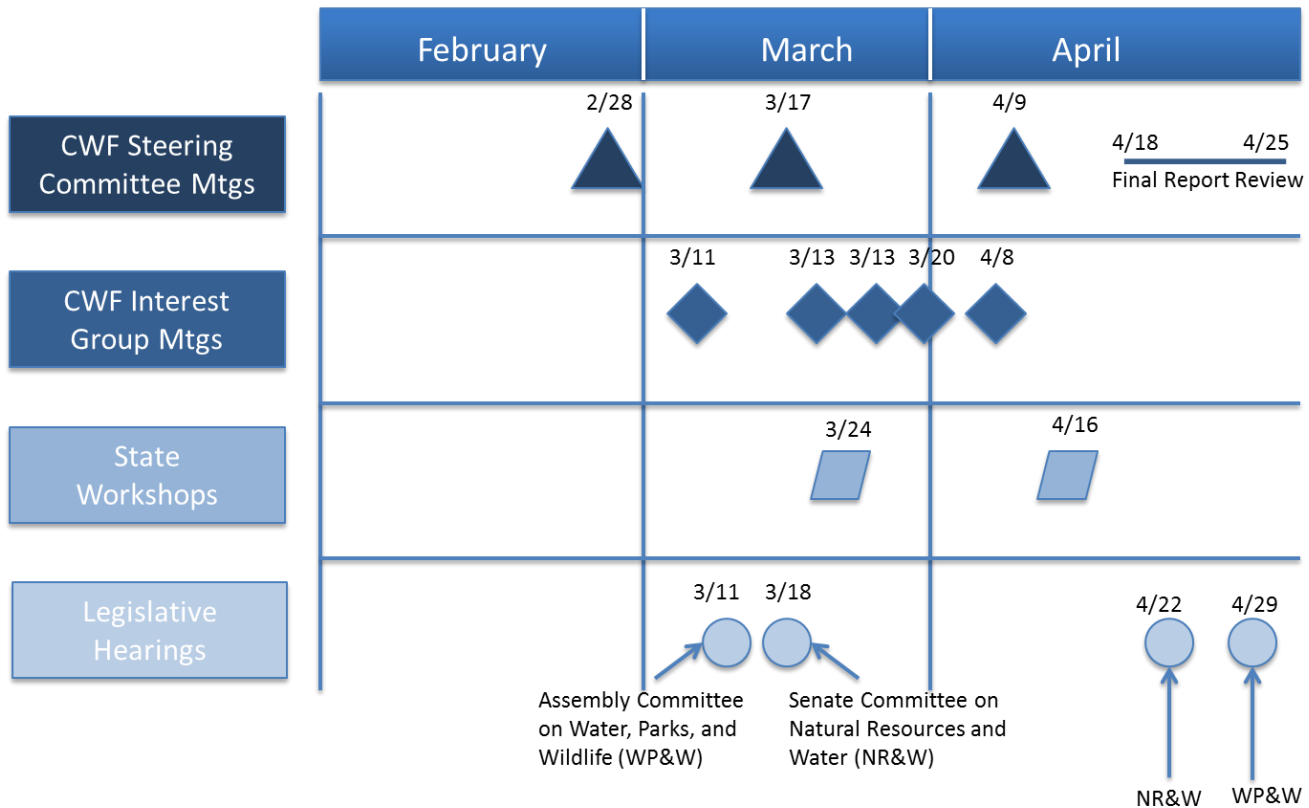
APPENDICES



Proposed Groundwater Management Framework



Sustainable Groundwater Management Processes



Steering Committee List

Grant Davis and Marcus Trotta, Sonoma County Water Agency
 Dan Dooley, University of California
 Laurel Firestone, Community Water Center
 Jim Fiedler, Santa Clara Valley Water District
 Paul Gosselin, Butte County
 Joe Grindstaff, Inland Empire Utilities Agency
 Maurice Hall, The Nature Conservancy
 Karen Keene, California State Association of Counties
 Ken Manning, California Groundwater Coalition, San Gabriel Basin Water Quality Authority
 David Orth, Kings River Conservation District
 David Puglia, Western Growers Association
 Randy Record, Eastern Municipal Water District
 John Sweigard, Merced Irrigation District

California Water Foundation

Andrew Fahlund, California Water Foundation
 Lester Snow, California Water Foundation
 Kate Williams, California Water Foundation

Kearns & West Facilitation Team

Mike Harty, Kearns & West
 Morgan Lommele, Kearns & West
 Anna West, Kearns & West



CWF developed an online Information Bank available to the public to promote transparency and understanding about groundwater management. The initial set of resources is now available on our website www.californiawaterfoundation.org.

Resources

1. "State Water Boards Groundwater Workplan Website." California Environmental Protection Agency, State Water Resources Control Board, Accessed on February 21, 2014. Added on February 24, 2014.

- This website includes milestones and timeline, available documents, links to external reports with groundwater management recommendations, and staff contacts.

2. "California Water Action Plan." State of California, January 2014. Added on February 24, 2014.

- This Action Plan was developed by the California Natural Resources Agency, California Department of Food & Agriculture, and the California Environmental Protection Agency (CAL/EPA).

3. "Discussion Draft – Groundwater Workplan Concept Paper." California State Water Resources Control Board, October 4, 2013. Added on February 24, 2014.

- This discussion draft was developed by the California State Water Resources Control Board and published on October 4, 2013. The document was available for public comment until December 18, 2013. Comments received are available

4. "California Statewide Groundwater Elevation Monitoring Program – Groundwater Basin Prioritization Process." California Department of Water Resources, December 2013. Added on February 24, 2014.

- This brochure, maps, and white paper includes a draft statewide ranking of groundwater basin importance.

5. "Executive Summary: Sustainability From The Ground Up, Groundwater Management in California – A Framework." Association of California Water Agencies, April 2011. Added on February 24, 2014.

- This executive summary outlines the Association of California Water Agencies framework for groundwater management in California.

6. "Uncommon Innovation: Developments in Groundwater Management Planning in California." Rebecca Nelson, Stanford University, Woods Institute for the Environment, March 2011. Added on February 24, 2014.

- This report analyzes over 50 local groundwater management plans to find promising and innovative approaches to local groundwater management. The approaches are organized into four key themes: involving stakeholders, collecting good information, adopting a diverse "portfolio" of approaches to groundwater management, and taking steps to ensure that a plan can be implemented in practice.

7. "Under water: Monitoring and regulating groundwater in California." M. Rhead Enion, UCLA, School of Law, Pritzker Briefs, July 2011. Added on February 24, 2014.

- This paper describes the importance of groundwater to California and re-imagines groundwater management. It recommends a series of steps that California should undertake to achieve the goal of realigning the water rights system for groundwater.

8. "California's Groundwater: Bulletin 118 – Update 2003 Report." California Department of Water Resources, October 2013. Added on February 25, 2014.

- This California Department of Water Resources website includes the Bulletin 118 Update Report from 2003, including the complete report and downloads of individual report sections.

9. "The Delta Plan: Ensuring a Reliable Water Supply For California, a Healthy Delta Ecosystem, and a Place of Enduring Value." Delta Stewardship Council, 2013. Added on February 25, 2014.

- This plan was developed by the Delta Stewardship Council, which was established by the California legislature in 2009. The next edition of the Delta Plan is due in 2018 or sooner.

10. "Liquid Assets: Improving Management of the State's Groundwater Resources." California Legislative Analyst's Office, March 24, 2010. Added on February 25, 2014.

- This California Legislative Analyst's Office (LAO) report includes background, the state's approach to, current issues, and other states approaches to groundwater management. The report also presents the Legislature with a series of actions.

11. "Improving Management of the State's Groundwater Resources." California Legislative Analyst's Office, February 1, 2011. Added on February 25, 2014.

- This California Legislative Analyst's Office (LAO) report was presented to Assembly Water, Parks and Wildlife Committee, Hon. Jared Huffman, Chair.

12. "Managing California's Water: From Conflict to Reconciliation." Public Policy Institute of California, 2001. Added on February 25, 2014.

- This book includes three parts – Part 1 reviews past, present, and future conditions of water management in California; Part 2 focuses on major challenges and promising approaches for managing water in the future; Part 3 explores strategies for implementing policy reforms.

13. "Governor's Commission to Review California Water Rights Law." Governor's Commission, December 1978. Added on February 26, 2014.

- This commission report includes analysis and recommendations on certainty in water rights, improving efficiency in water use, protection of instream uses of water, and effective management of groundwater resources.

14. "Integrated Regional Management: Solving the Groundwater Challenge." Barton H. Thompson Jr. and Rebecca Nelson, Stanford University, Woods Institute for the Environment, October 2010. Added on February 26, 2014.

- This Solution Brief proposes integrated regional management as a potential solution to groundwater management challenges.

15. "Report of the Conservation Commission of the State of California." Conservation Commission of the State of California to the Governor and Legislature of California 1912. Added on March 25, 2014.

- This report was transmitted to the Governor and the Legislature on January 1, 1913.

16. "Irrigation of Twelve Million Acres in the Valley of California" Col. Robert Bradford Marshall, Distributed by the California State Irrigation Association, March 16, 1919. Added on March 25, 2014.

- This report, California's Greatest Opportunity – Reclaiming An Empire—The Valley of California. Making Homes for 3,000,000 People. Increasing the Present Value More Than \$6,000,000,000. By Col. R. B. Marshall was distributed by the California State Irrigation Association.

17. "The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention." *Michigan Law Review*, Joseph L. Sax, January 1970. Added on March 25, 2014.

- This article published in the Michigan Law Review discusses The Nature of the Public Trust Doctrine, The Contemporary Doctrine of the Public Trust: An Instrument for Democratization, and includes a Conclusion.

18. "Report of the State Water Commission of California." *California State Water Commission*, January 1, 1917. Added on March 25, 2014.

- This report of the State Water Commission of California was submitted to the Governor of the State of California on December 20, 1916 and published on January 1, 1917.

19. "Legal Classification of Groundwater." *California State Water Resources Control Board, Hearings Program, Legal Classification of Groundwater*. Added on March 25, 2014.

- This webpage includes information that the State Water Resources Control Board gathered regarding the test for classifying subterranean streams flowing through known and definite channels.

20. "Land Subsidence from Groundwater Use in California" *Luhdorff & Scalmanini Consulting Engineers, Borchers & Carpenter, with support by California Water Foundation*, April 2014, Added on April 21, 2014.

- This report focuses on the escalating occurrence and severity of land subsidence due to groundwater pumping in California.

GLOSSARY

Adjudication. A case or proceeding to determine all the water rights in a stream system and/or groundwater basin. In the context of an adjudicated groundwater basin, landowners or other parties have turned to the courts to settle disputes over how much groundwater can be extracted by each party to the decision.

Aquifer. A saturated body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs.

Bulletin 118. The Department of Water Resources originally published Bulletin 118 in 1975 to present the results of groundwater basin evaluations in California. The Bulletin 118 – Update 2003 identifies 515 groundwater basins and subbasins and includes information about the geology, groundwater quantity and quality, and current groundwater management practices in the basins.

Conjunctive Use. The coordinated and planned management of both surface water and groundwater resources in order to maximize the efficient use of the resource.

Groundwater Basin and Subbasin. An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom. DWR defined and delineated groundwater basins and subbasins in Bulletin 118. Out of 431 delineated groundwater basins, 24 basins are subdivided into 108 subbasins. These 515 defined groundwater systems underlie about 40 percent of the surface area of the State.

Overdraft. The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average. Because groundwater is extracted at a higher rate than it is replenished over this period of time, groundwater levels decline persistently under this condition.

Groundwater. Water that occurs beneath the land surface and fills the pore spaces of the alluvium, soil, or rock formation in which it is situated. It excludes soil moisture, which refers to water held by capillary action in the upper unsaturated zones of soil or rock.

Land Subsidence. The lowering of the natural land surface due to various processes, most notably groundwater extraction.

Recharge. Water added to an aquifer or the process of adding water to an aquifer. Groundwater recharge occurs either naturally as the net gain from precipitation, or artificially as the result of human influence.

Safe Yield. The maximum quantity of water that can be withdrawn annually from a groundwater basin without causing an undesirable result.

Sustainable Yield. The quantity of water that can be withdrawn from a sustainably managed groundwater basin. Sustainable yield differs from safe yield in that it accounts for impacts beyond lowering of groundwater levels. Determining sustainable yield involves developing a water balance for the basin, which includes the total water entering and leaving the basin, changes in the amount of water stored in the subbasin, and connections to surface waters. In addition to avoiding declining

groundwater levels sustainable yield of the basin avoids adverse impacts to instream beneficial uses and groundwater quality.

Surface Water. Water found in ponds, lakes, streams, rivers, reservoirs, and inland seas.

Watershed. A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.